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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/697,770	10/27/2000	Joseph Shapira	PM 268445	4437

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EXAMINER	
JACKSON, BLANE J	
ART UNIT	**PAPER NUMBER**
2685	9

DATE MAILED: 02/12/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/697,770	SHAPIRA ET AL.	
	Examiner	Art Unit	
	Blane J Jackson	2685	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10/27/00*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-28* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *5* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Drawings

1. Several of the drawings are objected to because they fail to clearly show the equipment relationships described in the Specification. It is unclear the how the expanded figure for 5a of figure 1 electrically and physically connects with the Active Array (5). Figure 6 does not completely address this question. Figure 7 indicates incomplete or incorrect numbers to indicate the power budget for the transmit circuit and the TX splitter (80) needs connection clarification to the Active Array (5). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Objections

2. Claims 4 and 18 are objected to because of the following informalities: they associate the receive elements with a power amplifier and the transmit elements with a low noise amplifier where the reverse would make operational sense. The following rejection treats the claim where an LNA is appropriate with the receive chain and a PA in the transmit chain. Appropriate correction is required.

Claim 23 is objected to because the claim includes an isolator element where the following "to sample a transmit signal emitted from the main antenna array" is the function of the claim element directional coupler, not an isolator, see Specification page

9, lines 18-22 and page 24, lines 1-5. The following rejection considers the isolator to isolate the antenna from the directional coupler and PA and the directional coupler samples the main transmit line to feed other array elements. Clarification is required.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1, 2, 5-7, 9 and 11-14 are rejected under 35 U.S.C. 102(e) as being anticipated by Eidson (U.S. Patent 6,411,824).

As to claims 1, 2 and 9, Eidson teaches a method for augmenting an existing base stations including a main antenna array and a diversity antenna array including replacing the diversity antenna array with a new diversity antenna array comprising both receive and transmit elements (Abstract, figure 6a is a simplified example of a base station with two way polarization diversity, column 5, line 49 to column 6, line 22 where the individual simple antennas (522), (520) and (524), an array used for transmit and receive are represent alternative antenna types and antenna array designs, column 17, lines 29-45, co-located to form one common array or where the antenna (array) phase centers may be separated by a few wavelengths if antenna position diversity is used

this forming the "main antenna array" and "new diversity antenna array" of the claim, (column 17, line 58 to column 18, line 6).

As to claims 5, 6 and 7, Eidson teaches the main antenna comprises a receiver and transmitter antenna array (in figure 6a, the individual antenna elements may each represent an array (column 17, lines 29-45) and separated by a few wavelengths for spatial diversity this forming the "main array" and "new diversity antenna array", an architecture common to receive diversity systems, column 17, line 58 to column 18, line 6).

As to claims 11, 12 and 13, Eidson teaches a base station where replacing the diversity antenna array with a new diversity array adds multiple diversity schemes the include space diversity and polarization diversity to a forward link of the base station (column 17, line 58 to column 18, line 6).

As to claim 14, Eidson with reference to claim 13, the space diversity is generated due to the spacing between the main antenna array and the new diversity antenna array and the polarization diversity is generated among the members of a set of receive antenna elements of the new diversity antenna array (in figure 6a, the individual antenna elements may each represent an array, column 17, lines 29-45 and separated by a few wavelengths for spatial diversity this forming the "main array" and

"new diversity antenna array", an architecture common to receive diversity systems, column 17, line 58 to column 18, line 6).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 3, 4, 8, 10 and 16-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Eidson with a view to Searle et al. (U.S. Patent 5,714, 957).

As to claims 3, 4, 8, 17 and 18, Eidson implies the receive and transmit elements of the new diversity antenna array are passive where each antenna element is not associated with an amplifier and a bandpass filter located at the top of a building (figures 2 and 3, column 6, lines 1-23).

Searle teaches a diversity cellular base station where the main elements of a "smart antenna" comprise a building supporting the antenna array and associated antenna electronics unit that includes beam formers, diplexers and amplifiers (figure 6a, column 4, lines 39-67). Searle discloses, at the top of a mast or building, single carrier transmit power amplifiers (52) and low noise amplifiers (62) for each receive path along are coupled through diplexers (48) to the beam formers and antenna array. Searle discloses that filters that cover just the transmit or receive frequency bands can be used as the coupling diplexer, column 5, lines 1-47).

It would have been obvious to identify in Eidson the location of the amplifiers and passive equipment of Searle within close proximity of the antenna array to establish a low system noise figure in the receive path and to minimize transmit power losses in the transmit path.

As to claim 10 with respect to claim 8, Eidson of Eidson modified teaches the diversity antenna comprises only a receiver antenna array (figure 6b, column 14, lines 1-28).

As to claims 16 and 22, Eidson teaches an existing base station including an antenna array arrangement having a main antenna array and a diversity antenna array, at least a portion of the antenna array arrangement includes a passive antenna array (figure 3, column 10, lines 10-55 and figure 6a), but does not teach replacing the passive antenna array with an active antenna array comprising both receive and transmit elements located at the top of the building.

Searle teaches a base station with pattern beam forming where the antenna array(s) and associated antenna electronics including beam formers, diplexers and amplifiers are mounted on a mast, tower or building (figure 6a, an LNA per receive beam and one PA per carrier, column 4, line 39 to column 5, line 32). It would have been obvious to identify in Eidson the location of the amplifiers and passive equipment of Searle within close proximity of the antenna array to establish a low system noise figure in the receive path and to minimize transmit power losses in the transmit path.

As to claims 19, 20 and 21, Eidson teaches the main antenna and diversity antenna array comprise a passive antenna array (in figure 6a, the individual antenna elements may each represent an array (column 17, lines 29-45, figure 10 representing a two channel diversity combiner that can be expanded to three channel as in figure 6a, and separated by a few wavelengths for spatial diversity this forming the "main array" and "new diversity antenna array", an architecture common to receive spatial diversity systems, column 17, line 58 to column 18, line 6).

7. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Eidson with a view to Searl (U.S. Patent 4,520,476).

As to claim 15, Eidson teaches an embodiment of a diversity array where the receive elements are not utilized by the transmitter (figure 6b, (609), (640)) but does not teach adding a time delay to a transmitter section of the new diversity antenna array to feed a time delayed sample to the new diversity antenna array, the time delayed sample being of a signal transmitted by the main antenna array.

Searl teaches a method in a duplex wireless communication system that samples the transmit signal, applies a determined phase shift (time delay) and sums this delay sample with the desired receive signal (figure 1, column 3, lines 8-63). It would have been obvious to modify the array system of Eidson with the sample and delay system of Searl to remove interference reflected by the transmit radiating elements into the receive elements of the antenna array.

8. Claims 23-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Eidson with a view to Akiya (U.S. Patent 6,329,880) and Searl (U.S. Patent 4,520,476).

As to claims 23-25, Eidson teaches a method for augmenting an existing base station, the existing base station including a main array, which comprises both transmit and receive antenna elements, and a diversity antenna array which comprises passive elements, the method comprising:

Replacing the diversity antenna array with a new diversity antenna array comprising both receive and transmit elements co-located at the top of a building to form one common array, (figure 3, base station with representative mast top array configured for receive and transmit diversity, column 10, lines 10-55, in figure 6a, the individual antenna elements are co-located and may each represent an array, column 17, lines 29-45 and separated by a few wavelengths for spatial diversity this forming the "main array" and "new diversity antenna array", an architecture common to receive diversity systems, column 17, line 58 to column 18, line 6),

Eidson does not teach coupling a directional coupler to the main antenna array and to the new diversity antenna array and connecting an isolator to the main antenna array *to sample a transmit signal emitted from the main antenna array in order to control the spurious emissions emitted from the base station (See claim objections).*

Akiya teaches an example of a conventional transmitting circuit for a conventional wireless transceivers where the forward output power of a power amplifier is sampled by a directional coupler and connected through an isolator to the radiating

element. The isolator is used to isolate the PA and directional coupler from the antenna load by absorbing any reverse power due to an impedance mismatch between the PA and antenna load such that the PA is not subjected to potentially destructive reverse power (column 1, line 36 to column 2, line 3). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Eidson with the conventional transmit circuits of Akiya to stabilize the output of the power amplifier and provide a sample the transmit line for monitoring purposes.

The combination of Eidson and Akiya do not teach coupling a directional coupler to the main antenna array and to the new diversity antenna array *and that the transmit line directional coupler samples the main antenna array in order to control the spurious emissions emitted from the base.*

Searl teaches a transmit circuit used in wireless communication devices where the main transmitter output is sampled by a directional coupler, delayed and coupled into the receive path, prior to the receive circuits, to create a signal from the forward transmit sample which is exactly opposite in phase an in equal amplitude to that of the reflected transmit (cross coupled) component contained in the desired signal (figures 1 and 2, column 3, lines 9-68). It would have been obvious to one of ordinary skill in the art at the time of the invention to further modify Eidson and Akiya with the feedback circuits of Searl to cancel interference cross coupled from a co-located transmit circuits and antenna(s).

9. Claims 26 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Eidson with a view to Akiya (U.S. Patent 6,329,880) and Nishikawa et al. (U.S. Patent 5,068,629).

As to claims 26 and 27, Eidson and Akiya teach an isolator in the transmit circuits but do not teach wherein the isolator is comprised of ferrite and possesses low internal intermodulation distortion (IMD). Nishikawa teaches a ferrite circulator/ isolator for preventing reflection of transmitted RF power by attenuating reverse direction signal power and being a passive component possesses low internal intermodulation distortion (as opposed to an active component, like the power amplifier (figure 1, column 1, lines 10-45). It would have been obvious to one of ordinary skill in the art at the time of the invention to select in the isolator of Eidson and Akiya the passive ferrite design of Nishikawa to minimize size, effectively isolate reverse signals in the UHF and microwave ranges and avoid IMD.

10. Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over Eidson, Akiya and Searl, and further in view to Searle et al. (U.S. Patent 5,714, 957).

As to claim 28, Eidson modified implies the receive and transmit elements of the new diversity antenna array are passive where each antenna element is not associated with an amplifier and other antenna electronics located at the top of a building (figures 2 and 3, column 6, lines 1-23).

Searle teaches a diversity cellular base station where the main elements of a "smart antenna" comprise a building supporting the antenna array and associated

antenna electronics unit that includes beam formers, diplexers and amplifiers (figure 6a, column 4, lines 39-67). It would have been obvious to identify in Eidson modified the location of the amplifiers and other related passive equipment of Searle within close proximity of the antenna array to establish a low system noise figure in the receive path and to minimize transmit power losses in the transmit path.

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Genfan (U.S. Patent 6,337,607) discloses a surface mount low IMD ferrite isolator/ circulator structure. Note the Genfan filling date is predated by the applicant's effective filling date.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Blane J Jackson whose telephone number is (703) 305-5291. The examiner can normally be reached on Monday through Friday, 8:00 AM-5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Urban can be reached on (703) 305-4385. The fax phone number for the organization where this application or proceeding is assigned is (703) 812-9314.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number 703 306-0377.

BJJ

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